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*the private rate of return on investment  
in education in the republic of south africa  
for 1960 and 1970*



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SOUTH AFRICAN HUMAN SCIENCES RESEARCH COUNCIL

**THE PRIVATE RATE OF RETURN ON INVESTMENT  
IN EDUCATION IN THE REPUBLIC OF SOUTH AFRICA  
FOR 1960 AND 1970**

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INSTITUTE FOR MANPOWER RESEARCH

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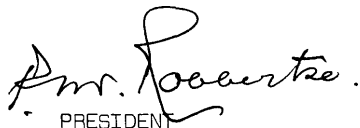
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## PREFACE

This study, which forms part of the research programme on incomes and salaries of the Institute for Manpower Research, tries, inter alia, to answer the question "Does education pay?". A purely economic answer is given to this question when rates of return on investment in education are calculated. This does not mean that non-monetary benefits that arise from education, for both the individual or for society as a whole, are negated.

Analyses of the incomes of economically active persons by means of the rates-of-return method remain useful in the sense that the HSRC learns more about the dynamics of the South African labour market quite apart from giving an economic answer to the question of whether education pays or not.

A word of thanks is due to the Department of Statistics for allowing the HSRC to use special tabulations from the 1960 and the 1970 population census. Thanks are also due to the Editorial Department of the Institute for Information and Special Services for editing the report and to the Institute for Statistical Research for the basic tabulations.

  
PRESIDENT



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## OPSOMMING

Hierdie verslag handel oor die rendabiliteit van belegging in onderwys. Die basiese gegewens waarop die opbrengskoerse bereken is, is van die bevolkingsensus van 1960 en dié van 1970 vir Blankes, Kleurlinge en Asiërs verkry. Opbrengskoerse word vir 7 onderwyspeile vir manlike werknemers bereken. Blankes, Kleurlinge en Asiërs word as afsonderlike ondersoekgroepe beskou.

## SUMMARY

This report deals with the profitability of investment in education. The basic data on which the rates of return are calculated, are drawn from the 1960 and the 1970 population census for Whites, Coloureds and Asians. Rates of return are calculated for 7 educational levels for male employees. Whites, Coloureds and Asians are treated as separate research groups.



THE PRIVATE RATE OF RETURN ON INVESTMENT IN EDUCATION IN THE  
REPUBLIC OF SOUTH AFRICA FOR 1960 AND 1970

CHAPTER 1

INTRODUCTION

It is reasonable to ask whether the returns which educated persons obtain from their input in education are high enough to justify the levels of expenditure because education is costly in terms of money and time. Resources devoted to education have alternative uses. The return on the investment in education should therefore, be measured for the purpose of comparison. Such analyses do not deny the social and cultural values attributed to education, rather they attempt to complement them. (Terreblanche, S.J., 1970).

Expenditure on education can be regarded as partly an investment and partly consumption and it is difficult to separate the two. A family, for example, could decide that one of its members must receive an additional year's schooling. This can be regarded as consumption. It does turn out, however, that the additional year's schooling makes that member more productive when he enters the labour market. According to the classical definition, this is investment. According to Blaug (1970) the definition of consumption or investment changes as the angle of vision does. In this report education will be viewed as investment. The yield on this investment is then used as comparative criterion.

There are basically two points of view from which one can look at investment in education, namely (a) from the individual investor's viewpoint - which is measured by the private rate of return, and (b) from a social investment viewpoint - which is measured by the social rate of return on the investment.

The private rate of return is calculated from after-tax incomes and costs refer only to that part of educational expenses which are borne by the individual. A social rate of return, on the other hand, refers to before-tax incomes and includes the total educational costs borne by the government. The two kinds of rates serve different purposes. Social rates are to be compared with the returns to alternative social investment opportunities (like building a dam), whereas the private rates are to be compared with private investment opportunities (like yield of investment in shares etc.) .

A difference between a social and a private rate of return on educational investment has two origins. First, only a part of the costs of schooling is usually borne by the individual and the rest by the government. Therefore the private yield is increased in return to the social rate of return. Second, the after-tax earnings are lower than the before-tax ones; therefore the private yield on return is reduced in relation to the social rate of return. In practice, the cost correction is stronger than the tax adjustment so that the private rate is usually higher than the social rate.

The aim of this study is to calculate the private rates of return on educational investment in the Republic of South Africa for Coloureds, Asians and Whites respectively for 1960 and 1970. A distinction is made between the three population groups, because they are at different stages of development, which tends to have an influence on the rates of return. Furthermore, the social system in the Republic of South Africa distinguishes between these population groups, and, therefore a difference in the rates of return can be expected. Lack of reliable information on salaries of the Bantu labour force is the only reason why this population group is excluded from this study.

The assumptions and methods used, are given in every step throughout the report. This will help to interpret the data in the correct perspective.

The research groups, samples and methods of calculation are described in Chapter 2. The profitability of educational investment is then calculated for South African conditions in Chapter 3. A summary of the report is given in Chapter 4.

## CHAPTER 2

### METHOD

#### 2.1 DEFINITION OF TERMS

The contents attached to special terms used in this project are shortly defined as follows:

##### 2.1.1 Median (Me)

A median is a statistical central value defined as that point on a scale of measurement above which exactly half the cases and below which the other half are found. In general, it is defined as a point and not a score or any particular measurement.

##### 2.1.2 Quartiles ( $Q_1$ $Q_3$ )

A quartile is a statistical measure defined as that point on a scale of measurement which divides a distribution in such a way that three-quarters of the cases are above and one quarter below the quartile point in the case of the first quartile ( $Q_1$ ), or three-quarters of the cases in a distribution are below and one quarter above the quartile value in the case of the third quartile ( $Q_3$ ). The second quartile, therefore, is equivalent to the median.

##### 2.1.3 Income

The income used in this study, is the yearly income and has the same content which was attached to it in the population census during 1960 and 1970. Incomes for men and women are given separately in the census and because only economically active persons are used in this report, incomes of employees will to a large extent reflect salaries.

##### 2.1.4 Present value of net incomes

The present value of an amount payable in two years, for example, can be defined as that quantity of money necessary to invest today at compound interest in order to have the required amount in two years. Therefore, the present value of an income is the amount at present that would accumulate to the amount of the income in some future year at a certain rate of interest. The net income is the income in a certain year minus the costs incurred during that year for obtaining a certain educational level.

### 2.1.5 Cost of education

For the purpose of this study the cost of education, which is regarded as the investment in education, consists of forfeited income and tuition fees as far as the individual is concerned.

### 2.1.6 Private rate of return

The private rate of return is used for measuring the rate of return on educational investment from the individual's viewpoint. Therefore costs actually incurred by the individual are assumed as the investment in an educational level, and earnings actually received, as the proceeds of an educational level. For the purpose of this study, forfeited income and tuition fees are regarded as the individual's investment, and after-tax income as proceeds of a specific educational level. The private rate of return is calculated by using the yield of an investment method.

### 2.1.7 Yield of investment or internal rate of return

The yield of an investment or the internal rate of return of the investment is defined as that rate of interest that will make the present value of the cash proceeds expected from an investment equal to the present value of the cash outlays required by the investment, in other words that rate of interest at which the present value (2.1.4) will be zero.

### 2.1.8 Educational level

The educational level of an employee is defined here as the highest school standard he has achieved or where applicable, the highest degree he has obtained. This means that employees who have a post-school diploma will be classified according to the level with which the highest school standard tallies.

## 2.2 SAMPLES

### 2.2.1 Selection

The following samples are used in this study:

(a) A 10 per cent sample of the 1960 population census for Whites. This sample includes every tenth White of each district in the Republic of South Africa.

(b) A 20 per cent sample of the 1960 population census for Asians and Coloureds. Every fifth Coloured and Asian in the 1960 population is selected for this sample.



(c) The official 10 per cent sample of the 1970 population census of the Department of Statistics for all three population groups. Every tenth person was randomly selected from the 1970 population for this sample.

### 2.2.2 Representativeness of samples

In Tables 2.1, 2.2 and 2.3, a  $3\frac{1}{3}$  per cent sample of Whites in 1960 is compared with the published figures for the population of the Republic of South Africa. The  $3\frac{1}{3}$  per cent sample is selected from the 10 per cent sample, which is used in this study by means of random selection of every third person. It is therefore assumed that if the  $3\frac{1}{3}$  per cent sample is representative of the population, the 10 per cent sample from which the  $3\frac{1}{3}$  per cent sample is drawn will also be representative of the population. In Table 2.1 the occupational situation of the  $3\frac{1}{3}$  per cent sample is compared with that of the published figures for the population for 1960. There is no significant difference between the sample and population in connection with occupational distribution.

In Tables 2.2 and 2.3 the  $3\frac{1}{3}$  per cent sample is compared with the population with regard to the income and age distributions respectively. Each category in the  $3\frac{1}{3}$  per cent sample is adequately represented and the  $3\frac{1}{3}$  per cent sample is therefore regarded as a representative sample of the population on these two aspects. As the  $3\frac{1}{3}$  per cent sample has been drawn from the 10 per cent sample used in this study, the 10 per cent sample is regarded as being representative of the 1960 White population in the Republic of South Africa.

In Tables 2.4, 2.5 and 2.6 the 20 per cent samples which are used for the Coloureds and Asians are compared with the published figures for 1960 on age distribution, level of education and income. As far as age and educational level are concerned, no significant difference can be spotted and these samples are regarded as reasonably representative of the population on these two variables. Although some objection could be raised to the income distribution given in Table 2.6, the differences spotted here, will not have a major influence on the calculation of an income flow for the Coloureds and Asians, because the median or quartile incomes, which are not sensitive to extremes, are used. Furthermore, an income flow calculated from the observed income, is used in order to diminish the influence of extreme incomes. The sample is therefore regarded as suitable for the aims of this report.

The sample to be used for the 1970 calculations cannot be compared with the 1970 population figures, since these are not available yet.

TABLE 2.1  
 OCCUPATIONAL DISTRIBUTION (PERCENTAGES) OF ECONOMICALLY ACTIVE  
 WHITE MALES,  $3\frac{1}{3}$  PER CENT SAMPLE AND THE POPULATION IN 1960

Occupation	Population*	Sample
1 Professional, semi-professional and technical workers	10,2	10,2
2 Administrative workers	6,4	6,4
3 Clerks	15,7	15,8
4 Sales workers	7,4	7,0
5 Farmers	13,6	12,4
6 Mine workers	3,7	3,9
7 Transport workers	7,6	7,8
8 Artisans and production process workers	30,3	31,7
9 Service workers	5,1	4,7
TOTAL	100	100

\*Vol 4, Population census 1960, pp. 42 to 44

TABLE 2.2  
 YEARLY INCOME DISTRIBUTION (PERCENTAGES) OF ECONOMICALLY ACTIVE  
 WHITE MALES,  $3\frac{1}{3}$  PER CENT SAMPLE AND THE POPULATION IN 1960

Yearly income in rand	Population*	Sample
1 to 399	4,8	4,1
400 to 799	9,9	9,6
800 to 1199	11,2	10,7
1200 to 1599	13,6	13,2
1600 to 1999	18,2	18,9
2000 to 2999	25,5	26,6
3000 to 3999	7,7	7,7
4000 to 5999	5,4	5,4
6000 to 9999	2,5	2,5
10000 to	1,2	1,2
TOTAL	100	100

\*Vol 5, Population census 1960

TABLE 2.3

AGE DISTRIBUTION (PERCENTAGES) OF ECONOMICALLY ACTIVE WHITE MALES,  $3\frac{1}{3}$  PER CENT SAMPLE AND THE POPULATION IN 1960

Age	Population* Sample	
	15 to 19	5,9
20 to 24	13,1	13,0
25 to 34	25,3	25,8
35 to 44	23,3	23,6
45 to 64	32,4	32,1
TOTAL	100	100

\*Statistical Yearbook, 1968

TABLE 2.4

AGE DISTRIBUTION (PERCENTAGES) OF COLOURED AND ASIAN MALES, 20 PER CENT SAMPLE AND POPULATION IN 1960

Age	Coloured		Asian	
	Population*	Sample	Population*	Sample
1 to 14	45,3	45,3	44,4	44,2
15 to 24	18,2	18,4	20,8	20,6
25 to 34	13,4	13,5	13,6	13,8
35 to 44	9,4	9,3	9,6	9,8
45 to 54	6,7	6,7	6,5	6,3
55 to 64	3,9	3,9	3,2	3,2
65	3,1	2,8	2,2	2,0
TOTAL	100	100	100	100

\*Statistical Yearbook, 1968

TABLE 2.5

EDUCATIONAL LEVEL DISTRIBUTION (PERCENTAGES) OF COLOURED AND ASIAN MALES, 20 PER CENT SAMPLE AND POPULATION IN 1960

Educational level	Coloured		Asian	
	Population*	Sample	Population*	Sample
No education	47,0	47,9	39,1	41,2
Primary school	39,4	39,8	43,4	43,4
High school	12,7	11,4	16,6	14,5
Degree and Diploma	0,9	0,9	0,9	0,8
TOTAL	100	100	100	100

\* Vol. 4, Population census, 1960

TABLE 2.6

INCOME DISTRIBUTION (PERCENTAGES) OF ECONOMICALLY ACTIVE COLOURED AND ASIAN MALES, 20 PER CENT SAMPLE AND POPULATION IN 1960

Income	Coloured		Asian	
	Population*	Sample	Population*	Sample
0 - 399	73,6	72,6	53,9	51,1
400 - 999	19,9	19,7	33,5	36,5
1000 - 1999	5,9	4,5	9,5	7,0
2000 +	0,5	3,3	3,1	5,7
TOTAL	100	100	100	100

\*Vol. 5, Population census, 1960

## 2.3 RESEARCH GROUPS

Six research groups, one for each population group in 1960 and 1970 respectively, are selected from the samples described above, including only economically active male employees aged 15 to 65 years.

Women are excluded from the study because the majority of women reveal a broken pattern of participation in the labour force. This hampers the construction of a reliable lifetime income flow for females. Furthermore, if they were included with the males, their influence on the income flow would make calculation unreliable.

Only employees are included in the survey because the income of employers includes a risk premium and compensation for their entrepreneurship which makes their income incomparable with that of employees. Although this is a reasonable adjustment in selecting the research group, it can be argued that this adjustment diminishes the calculated rates of return on investment in education for the working population as a whole. (See Chapter 3.)

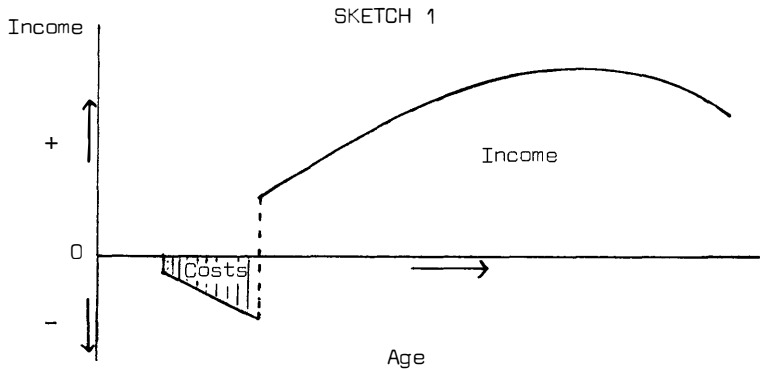
Furthermore, only the economically active population is included in the research group because its income is more related to its economic value than the income of that part of the population which is not economically active. Income received after retirement is to a large extent based on savings during the economically active period of life.

## 2.4 METHOD AND FORMULA FOR CALCULATION OF THE YIELD OF AN EDUCATIONAL LEVEL

### 2.4.1 Method of calculation

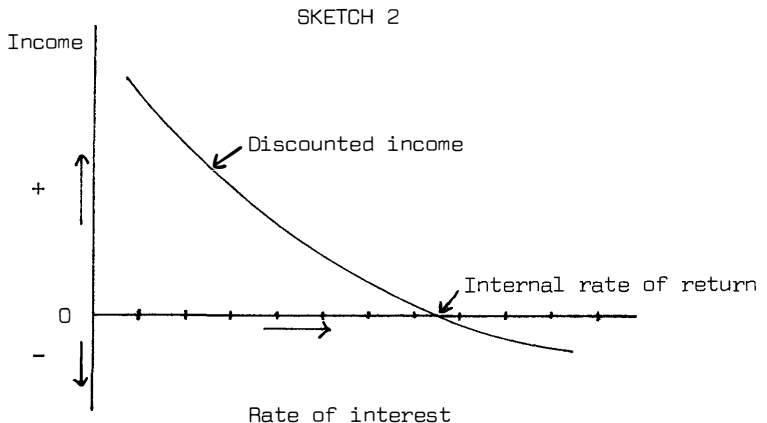
There are basically two methods (4,12) by which the relative economic advantage of an educational level can be measured, namely

(a) The discounted or present value of net life income stream According to this method, the income received during a working life with a certain educational level is regarded as positive income, and the costs borne in obtaining that educational level is regarded as negative income. See Sketch 1.



The difference between negative and positive income (net income) for each year of the working life of a person is discounted to a fixed date, for example at the age of 17 years.

Although the discounted value is a useful measure for measuring the relative economic advantage of an educational level, finding an appropriate rate of interest at which the income is to be discounted, is a major problem of this method. The interest rate has a major influence on the discounted value. See Sketch 2.



The discounted value decreases as the interest rate at which it is calculated, increases. This problem of a suitable interest rate is bridged when the second method (mentioned below) is used.

(b) The yield of investment in or the internal rate of return of an educational level According to this method, the costs borne in achieving an educational level are regarded as the outlay (or investment) for such education, while the income is regarded as the proceeds of that investment. The rate of return is calculated by using the same formula which is used for obtaining the discounted value namely by increasing the discount rate until the discounted value becomes zero. (See Sketch 2.) By doing this, the problem of finding an appropriate interest rate is bridged.

Other terms used to define the same concept are interest rate of return, return of investment, present-value return on investment, profitability index and marginal efficiency of capital (Bierman, H., Smidt, S., 1969).

Both these methods are used in this study.

In using these methods, a distribution of yearly income by educational level and age is required for each population group in 1960 and 1970.

#### 2.4.2 Categories for educational level, age and income

The educational levels used, are

- (i) No education
- (ii) Primary school
- (iii) Standards 6 and 7
- (iv) Standard 8
- (v) Standard 9
- (vi) Standard 10
- (vii) B degrees and B Hons. degrees.

Primary school education includes all levels of education from Sub A or Grade 1 to Standard five. Persons with a diploma which they have acquired after any school standard, other than Standard 10 are placed in the category of the highest school standard which they have passed. Standard 10 plus a diploma as a separate category is omitted because such a category would include an incomparable variety of diplomas, which would obviously create a misleading impression when compared with other educational levels. (For example technical diplomas and actual diplomas would be grouped together in such a category.) The Standard 10 category therefore includes only persons with a Standard 10 certificate.

The category B degrees and B Hons. degrees includes all variations of these degrees. M and D degrees were not considered because the numbers among the Coloured and Asian population who have obtained an M or D degree were too small for reliable analysis. Only completed educational levels are taken into account.

Ages, which range from 15 to 65 years, are grouped in 5-year intervals, beginning at 15 years. This leaves the age of 65 years as a single year category. Only a few cases are therefore expected in this category. It is assumed that a person's labour lifetime starts from his 15th year of age and ends when he is 65 years old.

In order to simplify the calculations, incomes are grouped in the following categories:

No income  
R1 to R99  
R100 to R199  
R200 to R299  
R300 to R399  
R400 to R499  
R500 to R599  
R600 to R699  
R700 to R799  
R800 to R899  
R900 to R999  
R1000 to R1199  
R1200 to R1599  
R1600 to R1999  
R2000 to R2999  
R3000 to R3999  
R4000 to R4999  
R5000 to R5999  
R6000 to R7999  
R8000 to R9999  
R10000 to R14999  
R15000 to R19999  
R20000 to R29999  
R30000 +

By using educational level, age and income as variables, frequency tables are drawn from the research groups, giving a distribution of the cases by income and age categories for each educational level. These frequency tables are then used to calculate the first and third quartiles and the median incomes for each age category on each educational level. For further calculations, that is for discounting the income flow and calculating



the yield on investment, the median income is used and assumed to be a representative description of income by age in 1960 and 1970. From the median income according to 5-year age categories, an income for each year between 15 and 65 years is then estimated from a second degree function which was fitted to the calculated median income by 5-year intervals, by using the usual method of minimum-square-deviation. These estimated incomes are then discounted and used for calculating the yield of educational levels. The step by step calculation is explained in Chapter 3.

### 2.4.3 Formula for calculation

The formula to be used in calculating the discounted net income is the following:

$$I = \sum_{t = 15 \text{ or } 17}^{65} (I_t - C_t) (1+i)^{-t}$$

Where I = the cash value of the estimated net incomes between the ages of 15 to 65 years,

t = the single-year age ranging from 17 to 65 years for Whites and 15 to 65 years for Asians and Coloureds. Whites must attend school until the end of their 16th year while Asians and Coloureds were not compelled to attend school in 1960 and 1970. It is generally accepted that the age of the economically active population ranges between 15 and 65 years,

$I_t$  = the estimated income in year t.

$C_t$  = the cost (or negative income) in year t, or investment in education described above, and

i = the selected discount rate.

The yield of an investment has been defined, (par. 2.1.7) as that rate of interest which makes the present value of the cash proceeds (income expected) from an investment equal to the present (or discounted) value of the cash outlays (or investment). The yield of an investment is calculated by the above formula for calculating the discounted value, by calculating an interest rate where the discounted value of the net income is equal to zero. (Where I = 0.)

It is apparent from the formula that, should no cost be incurred, the yield of investment (the internal rate of return) will be infinite.

## CHAPTER 3

### PROFITABILITY OF PRIVATE INVESTMENT IN EDUCATION IN THE RSA

In this chapter, the methods described in the foregoing chapter are applied to South African conditions.

#### 3.1 INCOME FLOW

##### 3.1.1 Observed incomes

Incomes which are received in practice are the best source of information for studies of this nature. In selecting this information, especially when income is required according to age or time, basically two methods are used, namely the following:

(a) By collecting information on the historical flow of income of a large number of persons with certain qualifications. Prediction of the expected future course is then made from this historical information. There are, however, two objections to this historical data method, namely:

(i) Historical data are usually difficult to obtain and where such data could be obtained, their validity is usually under suspicion.

(ii) It is dangerous to assume that factors which influenced income in the past, will have the same impact on the future level of income.

(b) The second method is the so-called cross-section method, which is fairly generally used in the human sciences, and which will be used in this study as well. According to this method, income and age data of a large number of persons are collected at a certain point in time. An analyses of the income according to age or time is then accepted as descriptive of income stream of that group for which the analyses according to age was made. This method eliminates the first objection mentioned above, but has the same assumption that historical factors will have the same influence in future as in the past. Furthermore, because income information of a group of persons which satisfies certain conditions is used, it is assumed that the groups in every category have equal qualities in all other factors (excluding those which group them together) which may influence income levels. These are important shortcomings which must be held in mind when calculations are interpreted. In spite of these limitations, this method can be applied usefully in studies concerned with the influence of age on income.

In Tables 3.1 to 3.6 the first quartile, median and third quartile of the observed income for the research groups are given according to population group, educational level and age for 1960 and 1970. The quartile and median incomes are used because these statistical values are not as sensitive to extremities which occur in the income distribution as the mean.

Figures 3.1 to 3.6 show that of most of the age-income profiles correspond approximately with the type of profile which is regarded as normal for cross-section age-income profiles, that is an initial positive slope up to approximately 40 to 45 years, followed by an eventual negative slope.

It appears from tables 3.1 to 3.6 that the minimum difference between the first, second and third quartile incomes occurs at the starting income. This means that income of persons starting work does not differ as much as the income of more experienced workers and that factors which determine income at higher ages, are more complex than those determining commencing income.

There are more differences between the first, second and third quartile incomes in 1970 than in 1960. This, among other factors, is duly the result of the decrease in the real value of money. In most cases, the first quartile income in 1970 is higher than the median income of 1960.

The general impression from the mentioned figures and tables is that a higher educational level has a higher income distribution.

### 3.1.2 Calculated income

By fitting a second degree regression function to the observed median income of the various groups (as shown in Tables 3.1 to 3.6) by means of the least squares method, the estimated income for each year of the working life is calculated.

Private rates of return are calculated from after-tax income. The income tax payable on each of the calculated yearly incomes must therefore be calculated. For the purposes of this study income tax for 1970 is calculated on the PAYE deductions made in 1970. For 1960 the actual normal tax minus primary discounts is taken into account, it is assumed that

- (a) men marry during their 25th year of age,
- (b) Whites have 2 children, born when the father is 27 and 29 years old,

(c) Coloureds and Asians have 3 children born when the father is 27, 29 and 31 years old,

(d) White children are dependent on their parents for 19 years, Coloured for 17 years and Asians for 18 years, and

(e) children of Whites with a degree are dependent an extra 3 years.

Based on these assumptions the income tax payable on the estimated yearly income each population group and educational level was calculated and subtracted from the estimated yearly income. The results of these calculations are tabulated in Tables 3.7 to 3.12.

### 3.2 COST OF EDUCATION FOR INDIVIDUALS

Tuition fees and forfeited income are regarded as costs borne by the individual for achieving a certain educational level. Forfeited income is that income which a person could have earned if he opted to become economically active instead of continuing his study. As the situation varies from person to person various assumptions have to be made to reflect the costs borne by the various groups in attaining a certain education level. These assumptions must then try to reflect an average situation. The assumptions used in calculating costs in this study are the following:

(a) Because of a system of compulsory education until the end of his 16th year a White person cannot become economically active before his 17th year. As there was no system of compulsory education for Coloureds or Asians in 1960 or 1970 it is assumed that these groups at the end of their 14th year have the choice of sacrificing income from their 15th year.

(b) It is assumed that Whites reach Std 10 at the age of 18 years. A White person with a Std 10 qualification entering the labour market is therefore regarded as being 19 years old. According to educational statistics of the Department of Statistics (report 08-08-02 for example) the median age of White male pupils was 17,54 years during June 1967. This means that the median age of Whites is 18,0 years at the end of the Std 10 year. Taking into consideration that an appreciable number of male Std 10 pupils has a commitment towards military training after Std 10 and that the failure rate of Std 10s is in the order of 18 per cent, it seems reasonable to suppose that the age of most White persons who become economically active with a Std 10 qualification will be 19 years of age.

TABLE 3.1  
THE FIRST QUARTILE, MEDIAN AND THIRD QUARTILE INCOME ACCORDING TO AGE AND EDUCATIONAL LEVEL FOR WHITES IN 1970

Age	No education				Primary school				Std 6 + 7				Std 8				Std 9				Std 10				B degree + B Hons.							
	N	Q <sub>1</sub>	Me	Q <sub>3</sub>	N	Q <sub>1</sub>	Me	Q <sub>3</sub>	N	Q <sub>1</sub>	Me	Q <sub>3</sub>	N	Q <sub>1</sub>	Me	Q <sub>3</sub>	N	Q <sub>1</sub>	Me	Q <sub>3</sub>	N	Q <sub>1</sub>	Me	Q <sub>3</sub>	N	Q <sub>1</sub>	Me	Q <sub>3</sub>	N	Q <sub>1</sub>	Me	Q <sub>3</sub>
15-19	5	225	550	750	66	162	409	581	1553	279	491	697	1591	368	610	757	258	320	600	752	757	353	605	779	2							
20-24	7	755	1350	1525	148	433	748	1171	2743	684	999	1449	3089	812	1149	1604	553	699	1001	1409	2043	822	1077	1454	262	900	1388	1747				
25-29	12	700	1199	1700	175	723	1047	1539	2710	1184	1596	1930	2428	1472	1806	2256	358	1486	1875	2441	1471	1540	1860	2415	560	1716	2190	2795				
30-34	9	850	1150	1550	201	847	1309	1786	2776	1355	1748	2166	2174	1653	1968	2568	342	1727	2138	2728	1407	1806	2293	2816	522	2279	2760	3580				
35-39	13	683	1033	1500	248	939	1348	1771	2811	1426	1820	2359	1764	1730	2156	2701	294	1827	2314	2794	1232	2008	2502	2995	467	2498	3209	3982				
40-44	19	717	1075	1633	316	1028	1360	1721	2774	1471	1865	2450	1508	1817	2291	2797	245	1884	2382	2864	1081	2123	2649	3425	336	2810	3565	4646				
45-49	15	275	1150	1850	435	1066	1400	1816	2765	1447	1853	2451	1264	1806	2321	2867	190	1909	2519	3292	908	2130	2743	3733	267	2795	3610	4694				
50-54	22	700	1100	1560	423	955	1298	1680	2476	1408	1834	2425	1036	1796	2324	2858	189	1897	2487	3258	688	2084	2807	3906	230	3106	3825	5024				
55-59	31	650	1011	1183	421	877	1199	1635	1606	1337	1777	2375	648	1708	2261	2966	106	1706	2359	3115	460	1928	2671	3790	200	2925	3691	4725				
60-64	37	690	986	1500	326	803	1196	1972	744	1217	1661	2204	305	1619	2093	2841	36	1500	2286	3800	200	1822	2521	3469	80	2278	3318	4625				
65	3		46	750	1057	1489			109	1045	1571	1943	37	1330	1767	2575	11	1567	2500	5250	40	1500	2187	2812	9	2312	2875	4583				
TOTAL	173				2805				23067				15844				2582				10287				2935							

TABLE 3.2  
THE FIRST QUARTILE, MEDIAN AND THIRD QUARTILE INCOME ACCORDING TO AGE AND EDUCATIONAL LEVEL FOR WHITES IN 1970

Age	No education				Primary school				Std 6 + 7				Std 8				Std 9				Std 10				B degree + B Hons.							
	N	Q <sub>1</sub>	Me	Q <sub>3</sub>	N	Q <sub>1</sub>	Me	Q <sub>3</sub>	N	Q <sub>1</sub>	Me	Q <sub>3</sub>	N	Q <sub>1</sub>	Me	Q <sub>3</sub>	N	Q <sub>1</sub>	Me	Q <sub>3</sub>	N	Q <sub>1</sub>	Me	Q <sub>3</sub>	N	Q <sub>1</sub>	Me	Q <sub>3</sub>	N	Q <sub>1</sub>	Me	Q <sub>3</sub>
15-19	8	100	400	1400	71	446	850	1181	623	461	949	1350	2206	506	897	1313	511	368	876	1300	2087	109	426	1306								
20-24	12	300	1200	2000	98	954	1417	2184	1014	1181	1717	2457	3681	1305	1941	2711	1276	1319	1978	2761	4901	1414	1956	2689	492	203	2414	3315				
25-29	16	1133	1800	3000	145	1354	2284	3263	1073	1620	2279	2964	3353	2027	2912	3697	1133	2477	3170	3862	3529	2505	3249	3925	971	3102	3912	4894				
30-34	17	1050	1933	2937	184	1622	2604	3529	1297	1956	2624	3411	3002	2638	3400	4098	803	2944	3579	4393	2587	3145	3827	4779	787	3969	5091	6677				
35-39	11	1350	2500	4250	217	1779	2694	3544	1471	2071	2725	3584	2520	2806	3582	4477	572	2917	3711	4718	2092	3349	4165	5355	531	4519	5819	7530				
40-44	17	2083	3250	3958	228	1697	2555	3439	1446	2188	2845	3702	2081	2917	3661	4615	468	3134	3759	4783	2011	3379	4249	5531	464	4985	6227	7872				
45-49	16	1400	3000	4000	204	1674	2372	3053	1531	2155	2837	3713	1834	2821	3586	4518	432	3151	3896	4886	1858	3433	4408	5804	462	5293	6800	9030				
50-54	11	950	1800	2750	238	1570	2281	2949	1651	2140	2820	3675	1363	2751	3557	4497	324	3200	3936	4851	1438	3462	4522	5943	308	5213	6674	9000				
55-59	17	1050	1550	1975	291	1582	2178	2921	1582	2095	2717	3560	1138	2612	3503	4524	254	2847	3767	4894	1129	3131	4257	5885	233	5281	6952	9320				
60-64	17	1214	1457	1950	207	1427	2152	2902	954	1758	2504	3414	689	2379	3308	4459	164	2750	3750	4937	612	3069	4287	6078	168	4809	6900	9481				
65	5	1050	1800	3750	31	1300	2045	2750	112	1550	2350	3091	77	2120	2833	4344	17	3031	3562	4187	98	3029	4571	5974	21	4125	5700	8875				
TOTAL	147				1914				12754				21944				5954				22342				4437							





FIGURE 3.1  
MEDIAN INCOME BY AGE AND EDUCATIONAL LEVEL, WHITE MALES, 1960

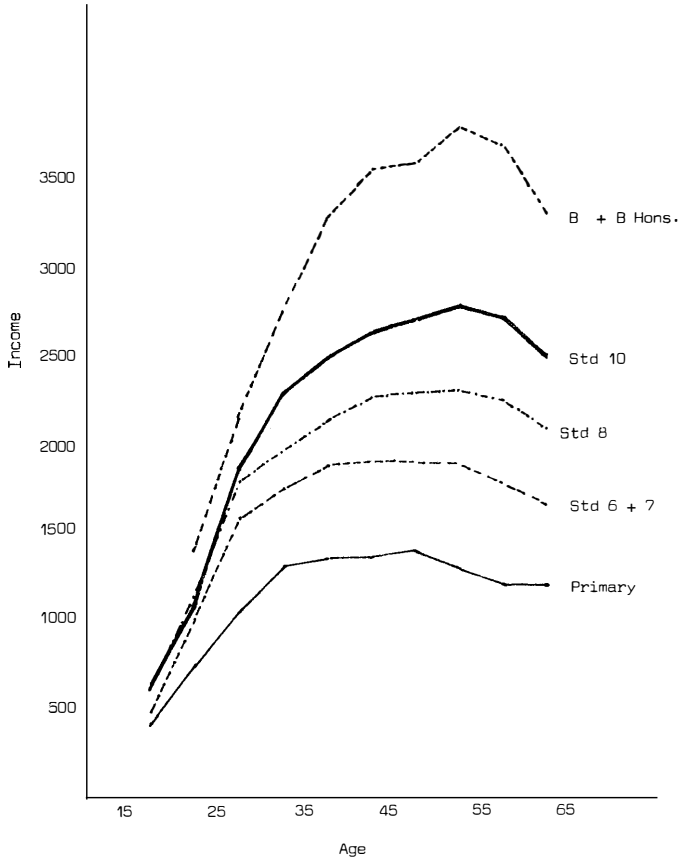




FIGURE 3.2  
MEDIAN INCOME BY AGE AND EDUCATIONAL LEVEL, WHITE MALES, 1970

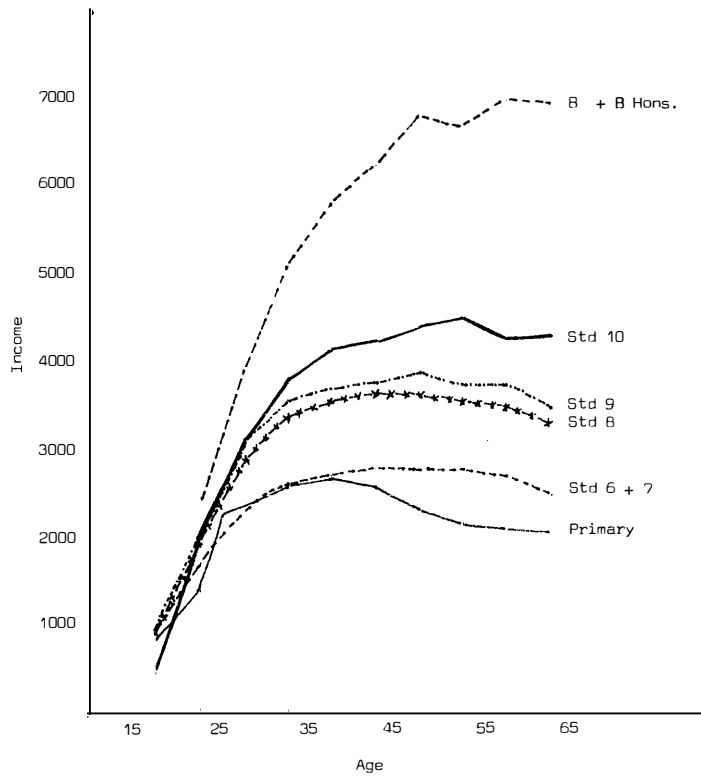


FIGURE 3.3  
 MEDIAN INCOME BY AGE AND EDUCATIONAL LEVEL, COLOURED MALES, 1960

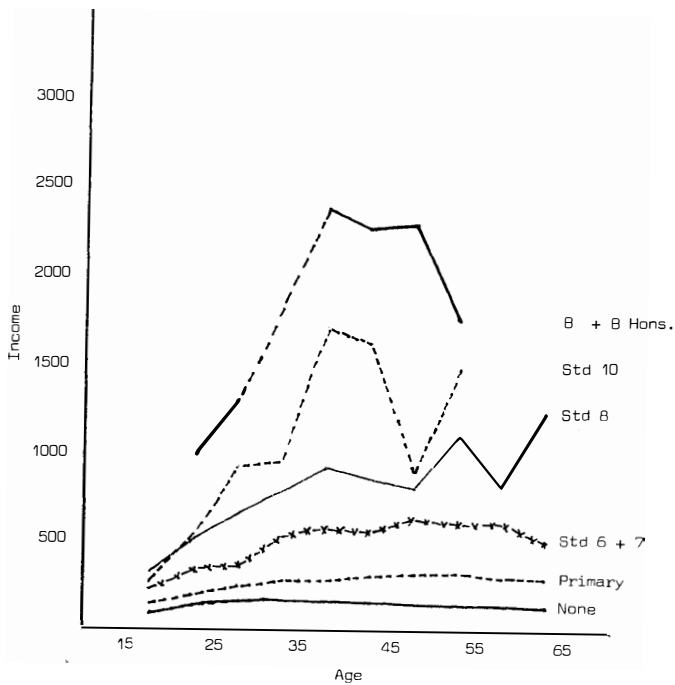


FIGURE 3.4  
 MEDIAN INCOME BY AGE AND EDUCATIONAL LEVEL, COLOURED MALES, 1970

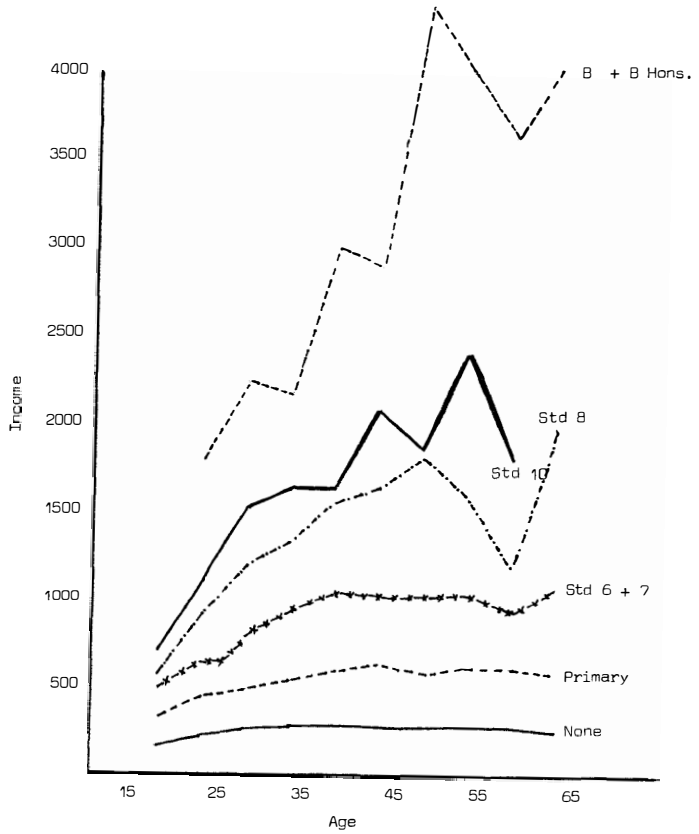


FIGURE 3.5  
 MEDIAN INCOME BY AGE AND EDUCATIONAL LEVEL, ASIAN MALES, 1960

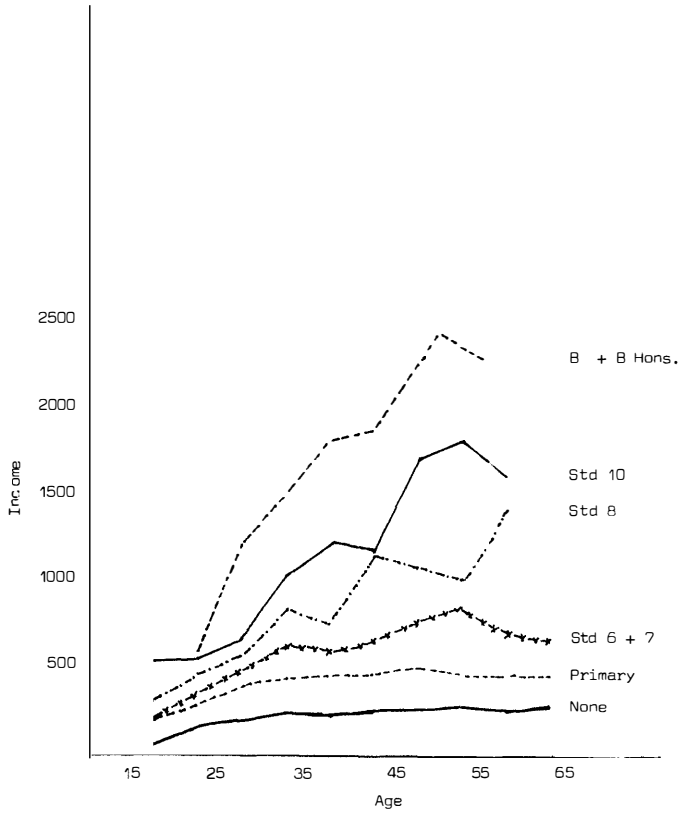
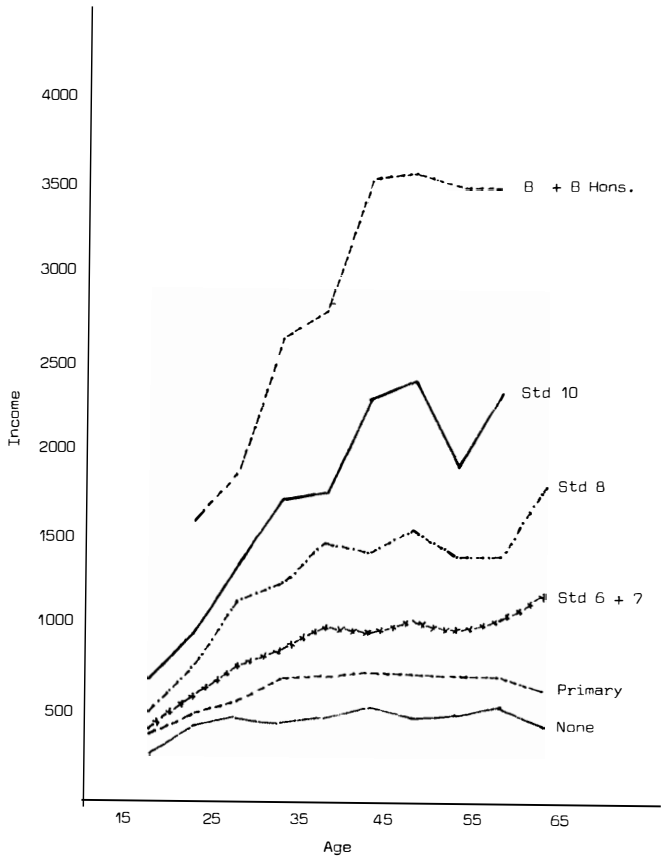


FIGURE 3.6  
 MEDIAN INCOME BY AGE AND EDUCATIONAL LEVEL, ASIAN MALES 1970



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TABLE 3.7  
AFTER-TAX INCOME OF WHITES FOR 1960 ACCORDING TO AGE AND EDUCATIONAL LEVEL

Age	No edu= cation	Primary school	Std 6 + 7	Std 8	Std 9	Std 10	B degree + B Hons.
15	906	374	390				
16	921	438	489				
17	936	499	585	613			
18	950	559	672	718	617		
19	963	615	754	821	734	731	
20	975	667	833	920	847	856	
21	986	716	909	1014	956	976	
22	998	764	982	1106	1061	1093	1280
23	1009	809	1053	1195	1162	1206	1430
24	1019	852	1120	1278	1259	1314	1574
25	1058	918	1216	1394	1387	1451	1751
26	1066	962	1278	1474	1477	1553	1886
27	1082	1003	1363	1581	1597	1684	2050
28	1090	1042	1423	1654	1679	1776	2176
29	1098	1078	1480	1739	1779	1894	2328
30	1104	1113	1534	1808	1859	1982	2442
31	1111	1146	1584	1873	1935	2062	2552
32	1116	1177	1631	1934	2003	2139	2655
33	1121	1206	1675	1989	2066	2208	2753
34	1125	1232	1716	2039	2124	2275	2845
35	1129	1257	1753	2085	2179	2337	2934
36	1132	1279	1788	2128	2229	2395	3016
37	1134	1300	1819	2167	2276	2449	2992
38	1136	1318	1846	2202	2318	2499	3164
39	1137	1334	1871	2235	2357	2544	3231
40	1137	1349	1892	2263	2391	2586	3290
41	1136	1361	1910	2288	2422	2623	3348
42	1135	1371	1925	2309	2449	2656	3399
43	1134	1379	1936	2327	2472	2684	3444
44	1131	1385	1945	2341	2491	2708	3485
45	1128	1389	1950	2352	2505	2729	3521
46	1125	1391	1952	2325	2483	2710	3549
47	1120	1391	1926	2329	2490	2723	3574
48	1105	1368	1925	2295	2459	2696	3594
49	1100	1356	1871	2291	2458	2699	3574
50	1094	1350	1861	2284	2453	2698	3583
51	1087	1342	1847	2273	2444	2692	3552
52	1081	1333	1831	2259	2431	2683	3551
53	1072	1321	1812	2242	2414	2669	3546
54	1064	1309	1790	2220	2394	2652	3533
55	1056	1292	1765	2195	2370	2629	3516
56	1045	1274	1736	2167	2341	2603	3493
57	1035	1255	1704	2135	2309	2573	3466
58	1025	1233	1670	2100	2272	2538	3432
59	1014	1211	1633	2060	2232	2499	3395
60	1002	1185	1592	2018	2187	2455	3351
61	988	1158	1549	1972	2139	2408	3303
62	975	1128	1502	1922	2086	2356	3249
63	961	1098	1453	1869	2030	2300	3191
64	945	1065	1400	1812	1970	2240	3126
65	929	1031	1345	1750	1905	2175	3057

TABLE 3.8

## AFTER-TAX INCOME OF WHITES FOR 1970 ACCORDING TO AGE AND EDUCATIONAL LEVEL

Age	No edu- cation	Primary school	Std 6 + 7	Std 8	Std 9	Std 10	B degree + B Hons.
15							
16							
17	313	1101	1052	966			
18	482	1193	1159	1137	1178		
19	646	1281	1262	1298	1352	1158	
20	793	1366	1362	1455	1518	1344	
21	930	1452	1451	1609	1677	1523	
22	1060	1528	1542	1758	1835	1695	2220
23	1188	1600	1628	1882	1970	1850	2462
24	1303	1670	1718	2017	2112	2013	2702
25	1474	1813	1872	2238	2348	2258	3041
26	1586	1878	1951	2367	2483	2412	3266
27	1736	1990	2103	2532	2656	2600	3533
28	1836	2051	2140	2647	2782	2742	3746
29	1943	2139	2250	2799	2941	2921	3994
30	2037	2190	2318	2902	3053	3053	4186
31	2124	2243	2375	2997	3151	3171	4367
32	2197	2290	2434	3086	3248	3282	4540
33	2271	2321	2487	3167	3337	3392	4707
34	2330	2373	2538	3242	3420	3494	4862
35	2386	2406	2584	3314	3500	3580	5012
36	2436	2436	2625	3376	3560	3669	5147
37	2478	2466	2664	3436	3626	3750	5279
38	2515	2488	2698	3488	3682	3825	5401
39	2550	2510	2732	3524	3733	3893	5524
40	2572	2525	2758	3564	3779	3958	5629
41	2589	2540	2785	3596	3819	4017	5730
42	2603	2551	2803	3627	3852	4070	5824
43	2611	2558	2822	3647	3883	4116	5906
44	2613	2557	2831	3655	3901	4152	5979
45	2607	2556	2842	3671	3918	4184	6047
46	2596	2557	2848	3675	3929	4210	6112
47	2536	2502	2805	3623	3882	4184	6158
48	2511	2490	2803	3619	3879	4196	6205
49	2438	2428	2742	3553	3818	4156	6193
50	2405	2413	2732	3531	3801	4160	6230
51	2364	2389	2723	3507	3782	4157	6200
52	2318	2366	2705	3478	3751	4147	6219
53	2265	2334	2684	3441	3719	4138	6219
54	2205	2304	2663	3397	3681	4115	6220
55	2143	2270	2638	3634	3634	4091	6222
56	2070	2231	2605	3288	3581	4059	6205
57	2002	2190	2571	3227	3526	4015	6179
58	1918	2143	2544	3161	3461	3970	6151
59	1829	2093	2504	3084	3392	3926	6114
60	1733	2047	2458	3006	3311	3867	6068
61	1630	1989	2409	2920	3231	3802	6016
62	1522	1926	2356	2827	3141	3734	5960
63	1411	1864	2299	2728	3045	3661	5860
64	1289	1794	2238	2625	2948	3574	5816
65	1165	1725	2177	2521	2838	3486	5735

TABEL 3.9

AFTER-TAX INCOME OF COLOURED'S FOR 1960 ACCORDING TO AGE AND EDUCATIONAL LEVEL

Age	No edu= cation	Primary school	Std 6 + 7	Std 8	Std 9	Std 10	B degree + B Hons.
15	84	109					
16	90	122	192				
17	95	134	219				
18	100	145	245	351			
19	105	156	270	394	348		
20	109	167	294	436	388	351	
21	114	177	318	476	428	449	
22	118	187	340	515	465	542	
23	122	197	362	552	502	629	857
24	126	206	383	588	537	707	1003
25	130	215	403	622	571	795	1172
26	134	223	422	654	603	871	1305
27	137	231	441	684	634	942	1462
28	140	239	458	713	663	1009	1578
29	143	246	475	741	692	1072	1702
30	146	253	491	767	718	1130	1808
31	149	260	506	791	744	1184	1907
32	152	266	520	814	767	1233	1996
33	154	271	533	834	790	1278	2077
34	156	277	546	854	811	1319	2149
35	158	282	557	872	831	1355	2213
36	160	286	568	888	849	1387	2268
37	162	290	578	902	866	1415	2314
38	163	294	587	915	882	1438	2352
39	165	297	595	926	896	1457	2381
40	166	300	603	936	908	1471	2401
41	167	303	609	944	920	1481	2412
42	168	305	615	951	930	1487	2415
43	169	307	619	956	938	1488	2409
44	169	308	623	959	945	1485	2364
45	169	309	627	960	951	1477	2342
46	170	310	629	960	955	1466	2279
47	170	310	630	959	958	1449	2242
48	169	310	631	956	960	1429	2161
49	169	310	631	951	960	1374	2108
50	169	309	629	944	959	1347	2046
51	168	307	627	936	956	1316	1977
52	167	306	625	927	952	1280	1898
53	166	304	621	916	946	1241	1813
54	165	301	616	903	939	1197	1719
55	163	298	611	888	931	1150	1616
56	162	295	605	872	922	1098	1506
57	160	291	598	854	910	1042	1387
58	158	287	590	835	898	982	1262
59	156	283	581	814	884	914	1126
60	154	278	571	792	869	841	984
61	152	273	561	767	852	764	823
62	149	267	550	742	834	682	653
63	146	261	539	714	815	596	474
64	143	255	524	685	794	505	286
65	140	248	511	655	772	410	89



TABLE 3. 10  
AFTER-TAX INCOME OF COLOURED'S FOR 1970 ACCORDING TO AGE AND EDUCATIONAL LEVEL

Age	No edu- cation	Primary school	Std 6 + 7	Std 8	Std 9	Std 10	B degree + B Hons.
15	163	288					
16	172	310	422				
17	180	330	462				
18	188	350	501	606			
19	196	366	539	679	717		
20	203	385	575	741	777	923	
21	211	403	610	804	830	991	
22	217	420	644	864	884	1056	
23	224	436	677	920	937	1111	1638
24	230	451	707	969	988	1170	1718
25	236	471	744	1062	1077	1280	1865
26	242	485	772	1116	1128	1332	1940
27	247	499	800	1168	1176	1407	2064
28	253	512	826	1217	1223	1462	2127
29	257	525	851	1263	1266	1514	2241
30	262	537	875	1307	1308	1565	2315
31	266	548	897	1349	1347	1611	2393
32	270	559	917	1388	1384	1657	2466
33	274	569	937	1423	1418	1700	2539
34	277	578	956	1457	1451	1740	2610
35	281	587	976	1488	1481	1778	2679
36	283	595	989	1517	1509	1813	2747
37	286	602	1003	1543	1534	1846	2813
38	288	609	1017	1567	1557	1876	2878
39	290	615	1029	1588	1578	1904	2938
40	292	620	1039	1605	1596	1930	2995
41	293	625	1049	1621	1612	1953	3052
42	294	629	1057	1634	1626	1973	3106
43	295	632	1064	1645	1637	1991	3159
44	296	635	1069	1653	1646	2007	3205
45	296	637	1073	1658	1653	2020	3195
46	296	639	1076	1661	1658	2031	3243
47	296	639	1078	1662	1660	2016	3233
48	295	640	1078	1660	1660	2018	3277
49	294	639	1077	1613	1615	1975	3270
50	293	638	1075	1605	1611	1976	3313
51	292	636	1071	1601	1603	1974	3354
52	290	633	1066	1588	1599	1973	3394
53	288	630	1060	1573	1587	1966	3437
54	286	626	1052	1559	1573	1957	3473
55	283	622	1043	1539	1557	1945	3506
56	280	617	1033	1516	1542	1931	3540
57	277	611	1022	1475	1521	1918	3572
58	274	604	1009	1467	1501	1899	3608
59	270	597	995	1440	1476	1878	3638
60	266	589	979	1412	1452	1858	3666
61	262	581	963	1376	1421	1835	3697
62	257	572	945	1342	1394	1806	3721
63	252	562	925	1305	1363	1779	3750
64	247	552	905	1266	1329	1745	3771
65	242	540	884	1225	1289	1713	3792

TABLE 3.11  
AFTER-TAX INCOME OF ASIANS FOR 1960 ACCORDING TO AGE AND EDUCATIONAL LEVEL

Age	No edu- cation	Primary school	Std 6 + 7	Std 8	Std 9	Std 10	B degree + B Hons.
15	55	146					
16	67	167	176				
17	79	187	207				
18	90	207	237	302			
19	101	226	267	338	310		
20	111	244	296	373	342	454	
21	122	262	323	407	375	489	
22	132	279	350	441	408	524	
23	141	295	376	475	442	559	811
24	150	311	401	508	475	594	878
25	159	326	426	541	508	630	972
26	168	340	449	573	542	666	1038
27	176	354	471	605	576	702	1112
28	184	367	493	637	609	738	1179
29	191	380	514	668	643	774	1245
30	198	391	533	698	677	811	1310
31	205	402	552	729	712	847	1373
32	212	413	570	758	746	884	1434
33	218	423	587	788	781	921	1494
34	223	432	604	817	815	959	1553
35	229	440	619	845	850	996	1610
36	234	448	633	873	885	1034	1665
37	239	455	647	901	920	1072	1719
38	243	462	659	928	955	1110	1772
39	247	468	671	955	990	1148	1823
40	251	473	682	981	1025	1187	1873
41	254	477	692	1009	1061	1225	1921
42	258	481	701	1032	1096	1264	1968
43	260	484	709	1057	1132	1303	2013
44	263	487	716	1082	1168	1343	2057
45	265	489	723	1105	1204	1382	2099
46	266	490	728	1130	1240	1422	2129
47	268	491	733	1153	1276	1462	2163
48	269	491	737	1176	1313	1500	2164
49	269	490	739	1199	1349	1537	2199
50	270	489	741	1204	1358	1541	2197
51	270	487	742	1223	1391	1578	2228
52	269	484	742	1244	1426	1616	2258
53	269	481	742	1263	1460	1655	2287
54	268	477	740	1282	1495	1694	2313
55	266	472	738	1301	1530	1732	2339
56	265	467	734	1318	1564	1771	2363
57	263	461	730	1336	1600	1810	2387
58	260	454	725	1354	1634	1849	2408
59	258	447	719	1371	1670	1888	2428
60	255	439	712	1387	1705	1928	2447
61	251	430	704	1403	1740	1967	2464
62	247	421	695	1419	1776	2007	2480
63	243	411	685	1434	1811	2047	2495
64	239	401	675	1449	1847	2087	2509
65	234	389	663	1464	1882	2128	2521

TABEL 3.12  
AFTER-TAX INCOME OF ASIANS FOR 1970 ACCORDING TO AGE AND EDUCATIONAL LEVEL

Age	No edu= cation	Primary school	Std 6 + 7	Std 8	Std 9	Std 10	B degree + B Hons.
15	304	316					
16	317	343	365				
17	330	366	405				
18	342	391	444	510			
19	350	415	480	581	644		
20	362	438	515	648	715	754	
21	372	460	550	711	781	832	
22	383	481	584	769	838	911	
23	393	501	616	824	897	983	1428
24	403	521	647	877	954	1051	1525
25	415	545	682	952	1044	1172	1687
26	424	563	711	1005	1099	1238	1782
27	432	580	739	1055	1153	1319	1922
28	440	597	765	1102	1203	1388	2012
29	447	612	791	1147	1250	1453	2130
30	455	627	815	1190	1295	1517	2216
31	461	641	838	1230	1337	1578	2305
32	468	653	850	1266	1376	1635	2392
33	474	665	881	1301	1412	1691	2476
34	479	677	900	1334	1445	1744	2558
35	484	687	918	1364	1476	1794	2637
36	489	697	936	1392	1504	1842	2713
37	493	705	952	1415	1531	1887	2786
38	497	713	967	1438	1552	1930	2857
39	501	720	981	1458	1571	1969	2924
40	504	727	994	1476	1588	2007	2981
41	506	732	1005	1491	1601	2041	3039
42	509	736	1015	1503	1612	2073	3093
43	510	740	1024	1513	1620	2102	3145
44	512	743	1032	1521	1625	2129	3194
45	513	745	1039	1526	1628	2146	3241
46	513	746	1045	1528	1628	2167	3225
47	514	746	1049	1528	1624	2185	3265
48	513	746	1052	1526	1618	2161	3247
49	513	744	1055	1520	1610	2175	3280
50	512	742	1055	1483	1561	2138	3262
51	510	739	1055	1473	1551	2146	3297
52	509	735	1054	1464	1533	2148	3324
53	506	730	1051	1449	1513	2150	3353
54	504	724	1047	1431	1494	2150	3375
55	501	717	1042	1416	1469	2148	3394
56	497	710	1036	1393	1444	2147	3415
57	493	702	1029	1372	1418	2139	3434
58	489	693	1020	1344	1383	2128	3444
59	484	683	1011	1318	1350	2115	3457
60	479	672	1000	1285	1314	2104	3467
61	474	660	988	1254	1276	2086	3475
62	468	649	975	1221	1235	2065	3480
63	461	635	960	1185	1191	2053	3482
64	455	621	945	1144	1142	2026	3481
65	447	606	928	1098	1089	2001	3478

(c) The median ages of Asian and Coloured Std 10 pupils are more or less 1 year higher than those of Whites (see report 21-03-03 of the Department of Statistics for example). In the case of Coloureds and Asians there are more pupils in the age group 19+ years than there are either 17 or 18 year olds. Taking into consideration that some of the pupils will fail Std 10 and will have to repeat the standard, the starting age for working life with Std 10 has been assumed to be 20 years.

(d) No tuition fees are taken into consideration for those attending school, while university students have fees as shown in Table 3.13.

TABLE 3.13

TUITION FEES FOR UNIVERSITY STUDENTS ACCORDING TO POPULATION GROUP AND YEAR OF STUDY IN 1960 AND 1970

Population groups	1960			1970		
	1st	2nd	3rd	1st	2nd	3rd
Whites	132	132	132	160	160	160
Coloureds	136	126	126	120	120	120
Asians	136	126	126	120	120	120

These fees are estimated from actual fees at the University of Pretoria, the University College for Indians (now the University of Durban-Westville) and the University of the Western Cape, during 1960 and 1970.

(e) The period of studying for a B degree is 3 years. As most of the professional B degrees (dentistry, architecture etc.) as well as the B.Hons. degree take more than 3 years, the estimate of costs is conservative. On the other hand forfeited income is taken into account for all persons, even those who study part-time and who are earning an income. No estimate was made of any incidental costs of education such as incurred by buying books or laboratory fees. As only economically active persons are included in the study, incomes earned by full-time students during vacations are not in any way taken into account. These incomes of students may be enough to off-set the incidental costs. The total cost of education for individuals, that is the total of forfeited after-tax income and tuition fees, is given in Table 3.14 according to population group and age for 1960 and 1970. Forfeited income is taken as that income which a person could have earned at his age if he entered the labour market with a lower educational level. The forfeited income is taken from Tables 3.7 to 3.12. Table 3.14 shows that tuition fees form a minor part of the total amount invested in education.

TABLE 3.14

TOTAL COST OF EDUCATION FOR INDIVIDUALS ACCORDING TO AGE AND POPULATION GROUP FOR 1960 AND 1970

Population group		Age							
		15	16	17	18	19	20	21	22
Whites	1960			613	617	863	988	1108	
	1970			966	1178	1318	1504	1683	
Coloureds	1960	109	122	219	351	348	487	575	688
	1970	288	310	462	606	717	1043	1111	1176
Asians	1960	146	167	207	302	310	590	615	650
	1970	316	343	365	510	644	874	952	1031

The cost of living (food, clothing, accommodation, transport etc.) an ever present factor, irrespective of whether a person is engaged in training or has started work, is not taken into account.

### 3.3 THE DISCOUNTED VALUE OF THE CALCULATED LIFETIME INCOME FLOW

The lifetime income stream (after-tax), shown in Tables 3.7 to 3.12, is now discounted by means of the discounting formula (par. 2.4.2).

The interest rate at which the discounting is done has a major influence on the discounted value. For this reason the discounted value is calculated according to a range of interest rates covering all even numbers from 0 per cent to 16 per cent. The 0 per cent of course gives the sum of the expected lifetime income stream. The discounted values for after-tax incomes for the three population groups are given in Tables 3.15 to 3.20.

The tables show that the expected lifetime incomes (0% column) increase as the educational level rises. This is true for all the population groups and for both 1960 and 1970.

The choice of an appropriate interest rate is a major problem when the profitability of the various educational levels are compared. Monetary experts in the RSA (5) suggested that 6 per cent could be regarded as a reasonable interest rate on a safe investment, and this rate will be used for discussion purposes.

TABLE 3.15

DISCOUNTED VALUE OF AFTER-TAX INCOME ACCORDING TO EDUCATIONAL LEVEL AND INTEREST RATES FOR WHITES  
IN 1960

Educational level	Discounted value								
	0%	2%	4%	6%	8%	10%	12%	14%	16%
No education	52099	32982	22560	16485	12709	10221	8494	7242	6300
Primary school	56169	34090	22255	15508	11424	8811	7054	5818	4915
Std 6 + 7	76607	46360	30123	20861	15260	11683	9285	7605	6384
Std 8	92365	55360	35631	24457	17745	13487	10649	8672	7242
Std 9	95887	56486	35594	23837	16826	12415	9500	7489	6048
Std 10	103175	59940	37143	24393	16843	12127	9036	6921	5419
B degree + B Hons.	127991	71600	42293	26190	16855	11171	7552	5157	3520

TABLE 3.16

DISCOUNTED VALUE OF AFTER-TAX INCOME ACCORDING TO EDUCATIONAL LEVEL AND INTEREST RATES FOR WHITES  
IN 1970

Educational level	Discounted value								
	0%	2%	4%	6%	8%	10%	12%	14%	16%
No education	94559	57298	36997	25295	18176	13626	10584	8467	6943
Primary school	104127	64126	42451	29955	22309	17367	14012	11635	9886
Std 6 + 7	115260	69919	45636	31798	23425	18069	14466	11933	10084
Std 8	146852	88072	56693	38907	28222	21444	16926	13780	11505
Std 9	151698	90288	57508	38927	27765	20689	15978	12705	10345
Std 10	159626	92492	57174	37460	25804	18534	13772	10518	8208
B degree + B Hons.	224657	125369	73996	45875	29621	19739	13454	9294	6446

TABLE 3.17

DISCOUNTED VALUE OF AFTER-TAX INCOME ACCORDING TO EDUCATIONAL LEVEL AND INTEREST RATES FOR COLOUREDS IN 1960

Educational level	Discounted value								
	0%	2%	4%	6%	8%	10%	12%	14%	16%
No education	7516	4516	2945	2063	1535	1198	971	811	693
Primary school	13165	7789	4991	3433	2508	1925	1537	1265	1068
Std 6 + 7	25768	14938	9339	6249	4431	3297	2550	2035	1665
Std 8	37545	21592	13281	8670	5954	4263	3156	2400	1863
Std 9	36772	20560	12254	7727	5108	3508	2482	1794	1317
Std 10	49316	28220	17004	10716	7010	4725	3258	2282	1613
B degree + B Hons.	70387	40125	23804	14599	9186	5884	3802	2454	1559

TABLE 3.18

DISCOUNTED VALUE OF AFTER-TAX INCOME ACCORDING TO EDUCATIONAL LEVEL AND INTEREST RATES FOR COLOUREDS IN 1970

Educational level	Discounted value								
	0%	2%	4%	6%	8%	10%	12%	14%	16%
No education	13302	8048	5286	3730	2793	2192	1786	1498	1285
Primary school	27975	16681	10795	7510	5550	4308	3475	2890	2461
Std 6 + 7	45125	26387	16657	11256	8059	6048	4714	3787	3116
Std 8	64473	36786	22423	14489	9833	6944	5061	3779	2873
Std 9	63881	35982	21579	13665	9050	6207	4369	3131	2266
Std 10	77216	42824	25225	15649	10124	6761	4614	3187	2205
B degree + B Hons.		64436	35534	20437	12109	7281	4358	2524	1340

TABLE 3.19

DISCOUNTED VALUE OF AFTER-TAX INCOME ACCORDING TO EDUCATIONAL LEVEL AND INTEREST RATES FOR ASIANS  
IN 1960

Educational level	Discounted value								
	0%	2%	4%	6%	8%	10%	12%	14%	16%
No education	10924	6290	3916	2618	1861	1393	1087	877	727
Primary school	20488	12042	7657	8225	3787	2884	2286	1870	1570
Std 6 + 7	29562	16826	10327	6788	4734	3469	2647	2085	1686
Std 8	46006	24803	14373	8906	5852	4040	2902	2151	1633
Std 9	50483	26325	14686	8726	5481	3605	2459	1723	1229
Std 10	57694	30107	16780	9938	6203	4042	2721	1873	1307
B degree + B Hons.	78700	40801	22295	12741	7535	4555	2772	1665	956

TABLE 3.20

DISCOUNTED VALUE OF AFTER-TAX INCOME ACCORDING TO EDUCATIONAL LEVEL AND INTEREST RATES FOR ASIANS  
IN 1970

Educational level	Discounted value								
	0%	2%	4%	6%	8%	10%	12%	14%	16%
No education	23411	14157	9307	6581	4940	3889	3177	2672	2298
Primary school	32337	19277	12458	8649	6376	4935	3970	3293	2798
Std 6 + 7	43532	25150	15689	10484	7429	5524	4270	3403	2780
Std 8	58946	33583	20434	13178	8926	6292	4579	3415	2595
Std 9	61598	34966	21110	13447	8955	6179	4379	3164	2315
Std 10	81378	44440	25787	15779	10088	6673	4521	3109	2148
B degree + B Hons.	100000+	62865	34801	20110	11993	7285	4434	2644	1487



According to Table 3.15 it was not profitable for Whites to continue to Std 10 if no further study after Std 10 was envisaged. This is probably due to the fact that many people leaving school after Std 8 receive in-service training as artisans while the group with Std 10 in this study have only the Std 10 qualification. The same situation applied in 1970 (Table 3.16). The difference in expected income between Std 8 and Std 9 school-leavers are small, perhaps because these persons tend to do the same kind of work and therefore receive the same kind of post-school vocational training.

As far as Asians are concerned it was profitable in 1960 to attempt to obtain a Std 10 qualification, but not to drop out at Std 9. In 1970 it was profitable to continue education (Tables 3.19 and 3.20). For Coloureds it was not profitable to drop out at Std 9 (Tables 3.23 and 3.24) either 1960 or 1970.

The tables show that the income of all population groups has increased appreciably during the period 1960-1970. To determine whether this increase also means an increase in real terms the 1960 and 1970 incomes are compared in Table 3.21. The 1960 income is made comparable to the 1970 income by using the consumer price index given as 225,4 in 1960 and 296,1 in 1970 with 1938 as the base (100).

TABLE 3.21

RATIO BETWEEN 1960 AND 1970 DISCOUNTED AFTER-TAX INCOME AT 6 PER CENT BY EDUCATIONAL LEVEL AND POPULATION GROUP (1970 PRICES)

Educational level	Whites	Coloured	Asians
No education	1,05	1,38	1,91
Primary school	1,49	1,67	1,26
Std 6 and 7	1,18	1,37	1,18
Std 8	1,20	1,27	1,13
Std 9	1,24	1,35	1,17
Std 10	1,16	1,11	1,21
B degree + B (Hons.)	1,33	1,07	1,20

Table 3.21 shows that the income structure of the RSA's male employees has changed during the period 1960-1970. All groups show an increase in real income. The highest rates for each of the population groups but especially for Asians and Coloureds, occurs in the lower ranges of the education levels. According to traditional price theory the different ratios point towards changes in the demand and supply of manpower, but because

of all the well known imperfections in the labour market, it is not possible to state categorically that the demand for persons with the lower levels of education has increased more rapidly than for those in the higher levels. Another factor which influences incomes in the South African labour market is the interaction between the population groups. The percentage of Asian and Coloured economically active males employed in the manufacturing and commerce sectors of the national economy has increased from 55,6 and 30,7 in 1960 to 62,6 and 34,3 in 1970. A large percentage of this labour force has a low educational level and 56,1 per cent of the Coloured artisans, operators and semi-skilled workers in commerce and industry had only primary school education or less in 1970. The percentage for Asians is 47,5.

The table indicates that the Coloured graduates' real income has shown the smallest increase of all groups during the period 1960-1970, viz about 7 per cent. In the case of graduates the occupational distribution will play an important role in determining the median wage levels. It appears that the more diverse the occupational distribution of graduates, the higher the increase in real income over the period. The occupational distribution of Whites is much more diverse than those of either Coloureds or Asians. To illustrate this diversification it can be mentioned that in 1970 (Ebersohn) 61,2 per cent of the economically active male Coloured graduates were teachers. In the case of Whites 44,3 per cent and in the case of Whites 19,7 were teachers.

### 3.4 YIELD OF INVESTMENT (INTERNAL RATE OF RETURN)

Another way to compare the relative financial gain of the different educational levels is by calculating the yield on the investment made to acquire the educational level (see par. 2.4.2.). This method is the most popular one in rate of return analyses because the problem of rate choice is solved in this way. Another problem, however, crops up and that is that the internal rate of return for all educational levels where no cost is incurred, is infinite. No comparison regarding the profitability of educational levels usually reached before the age of 15 in the case of Coloureds and Asians, and 17 in the case of Whites, can be made under the assumptions used for this study. The calculation of the internal rate of return however makes a comparison between an investment in education and alternative investment possibilities possible for all educational levels where cost is incurred. For the purposes of this calculation the after-tax incomes are regarded as the proceeds of an educational level and the costs, as indicated in Table 3.14, are regarded as the investment made to obtain that specific educational level.

As mentioned before, it is assumed that a person has the choice of becoming economically active from his 15th or 17th year of age and that no tuition fees exist for school training.

The yield on the investment (that rate at which the amount earned on the investment would be equal to the proceeds) is given in Table 3.22. No rate higher than 100% was calculated.

TABLE 3.22

THE PRIVATE YIELD ON INVESTMENT IN EDUCATION (AFTER-TAX INCOME)  
ACCORDING TO POPULATION GROUP AND EDUCATIONAL LEVEL FOR 1960  
AND 1970

Population group	1960						
	No edu= cation	Primary school	Std 6 & 7	Std 8	Std 9	Std 10	B degree + B Hons.
Whites	x	x	x	x	x	59	27
Coloureds	x	x	x	55	36	32	25
Asians	x	x	x	48	33	31	22

1970

Whites	x	x	x	x	x	55	29
Coloureds	x	x	x	42	32	28	20
Asians	x	x	x	42	34	28	22

x Higher than 100%

Table 3.22 shows that the internal rate of return decreases as the educational level increases. The declining rate of return pattern is consistent with what is known as "the law of diminishing returns" according to which successive increments of one factor of production (in this case an ever increasing investment in education as the education level increases) yield even lower returns at the margin because it combines with a more or less fixed quantity of all the other production factors. Table 3.22 shows that in most cases the internal rate of return has decreased over the period 1960-1970. Exceptions where the rates have either remained the same or have increased are for graduate Whites and Asians, and Asians with a Std 9 qualification.

One reason for these declining rates would be the higher incomes in the lower educational levels which increase the costs of education as forfeited income forms the larger part of these costs. That this has indeed been the case has already been pointed out.

Although most of the internal rates of return have decreased since 1960, the rates still show a high return.

To give more perspective to the internal rate of return calculated in this study, the internal rates of return for a number of countries (Psacharopoulos, 1972) indicated are in Table 3.23. No rates of return for countries with a long tradition of compulsory education can be calculated for primary schooling because of the fact that no costs were involved.

TABLE 3.23  
PRIVATE INTERNAL RATES OF RETURN FOR VARIOUS COUNTRIES

Country	Year	Educational level		
		Primary	Secondary	Higher
USA	1959	155,1	19,5	13,6
Canada	1961		16,3	19,7
Mexico	1963	32,0	23,0	29,0
Kenya	1968	32,7	35,2	27,4
New Zealand	1966		20,0	14,7
Netherlands	1965		8,4	10,4
Great Britain	1966		6,2	12,0
Norway	1966		7,1	4,5
India	1960	24,7	19,2	14,3
Nigeria	1966	30,0	14,0	34,0
Ghana	1967	24,5	17,0	37,0

When comparing these rates of return with those in South Africa certain shortcomings which affect the comparability severely must be kept in mind. The main shortcomings are (a) some rates are calculated on sample survey data and not on census data, (b) heterogeneity of the various educational levels across countries and (c) the various assumptions made for the calculations. This study shows that these assumptions can be numerous. As a result of these limitations, more value should be attached to the relative rather than the absolute values of these figures.

As in South Africa the table shows that the internal rate of return declines as the educational level increases. The less developed countries show a much higher rate of return on higher education than the more developed countries. This could be the result of a smaller income differential between the various educational levels in developed countries. If the income differential is small, the cost of higher education is relatively higher because forfeited income is consequently higher. The

bigger the income differential the higher the internal rate ought to be. Another factor which may play a part in lower rates of return for the highest educational level is our extremely progressive income tax system. The influence of the latter factor is, however, unlikely to be very important in rate of return analysis. Internal rates of return based on pre-tax income showed that the South African income tax rates, were the same for the lower educational levels and were only 1 per cent higher for White and Asian graduates. The difference in internal rates among countries is most likely due to income differentials.

To conclude : Internal rates of return for the three population groups under consideration are such that an investment in education can be regarded as a very profitable one although the yield in 1970 is in most cases lower than the yield for 1960.

## CHAPTER 4

### SYNOPSIS

The aim of this study is to calculate the private rates of return on educational investment in the RSA for Coloureds, Asians and Whites for 1960 and 1970. The lifetime income of the individual is regarded as the proceeds on his investment in a certain educational level; the investment being in this case his cost to acquire that level. Costs consist of forfeited income while attaining a higher level, and tuition fees. It is assumed that Coloureds and Asians have a choice at the beginning of their 15th year of either attaining a higher educational level or of starting work. In the case of Whites it is assumed that a person can choose at the beginning of his 17th year of age.

Basic data for this study were obtained from samples of the 1960 and the 1970 population censuses and consist of tabulations of income by age by educational level for White, Coloured and Asian male employees between the ages of 15 and 65.

Seven educational levels are used. These are -

- No education
- Primary school
- Std 6 + 7
- Std 8
- Std 9
- Std 10
- B and B (Hons.) degrees.

From the tabulations life income streams for each population group and each educational level were calculated by fitting a second-degree function to the median income of each 5-year age group at an educational level. The calculated income streams show that the estimated lifetime income of an individual increases as the education level becomes higher. The question is now to decide whether this income differential is large enough to compensate for costs incurred while obtaining a higher educational level.

The lifetime income streams were then discounted to their present value for a 15-year-old in the case of Coloureds and Asians and a 17-year-old in the case of Whites whilst taking costs into account, costs in this calculation being regarded as negative income. For the discounting formula see page 13. As the rate at which the discounting is done has a major influence on the discounted value, it is a problem to decide at which rate

one should compare the education levels with regard to their profitability. Monetary experts have suggested a rate of 6 per cent.

The discounted values at 6 per cent showed that in most cases it was profitable to obtain a higher educational level. This applied to the income structures in 1960 and 1970. Comparison of the discounted values of income streams for the various educational levels in 1960 and 1970 showed an increase in real income for the period 1960 to 1970. Persons with only primary school education showed the highest increase of all groups.

As mentioned, the rate at which the discounting is done influences the discounted value; the higher the rate, the lower the discounted value. If costs are present and the discounting is done at ever increasing rates, the discounted value will at some stage reach a value of 0. The rate at which this happens is called the internal rate of return. If no costs are taken into account, as happens when tuition up to a certain stage is free, the internal rate of return would be infinite.

If costs are regarded as investment, the internal rate of return gives the rate of return on that investment. The internal rates of return calculated in this study (Table 3.23) show that the rate declines as the educational level rises. The rate of return is still higher than 20 per cent for all population groups at all educational levels.

The conclusion reached is that the income structure of the Republic is such that individuals are in most cases amply rewarded for the cost incurred in obtaining a higher educational level.

Certain changes in the income structure are, however, apparent from the analyses. Coloureds and Asians are finding, in increasing numbers, employment in industry and commerce. Most of these are artisans, operators and semi-skilled workers with a low educational level (primary school or lower). The real income of these persons has increased markedly over the period 1960-1970. This means that the forfeited income of persons for higher educational levels increases and that the cost of education consequently becomes higher and the rate of return on the higher educational level tends to decline.

The discounted values of life-income streams at 6 per cent for Whites show that in 1970 it was not profitable to start work with Std 10 only. Std 8 and Std 9 school-leavers tend to

choose work in which they receive some kind of in-service training such as an apprenticeship, which costs them very little. The school-leavers with Std 8 or Std 9 were regarding income, as well off as school-leavers with Std 10 and no further formal training.

The analyses further suggest that the varied occupational structure of graduates tends to increase the rate of return on the total investment. The Coloured graduates of whom just more than 60 per cent are teachers, have had an increase in real income (1960-1970) of only 7 per cent, which is much lower than that of Asians (20%) or Whites (33%) who have a much more varied occupational structure for graduates.

To conclude : Although lower for most educational levels in 1970 than in 1960, the rates of return calculated in this study show that an investment in education is a very profitable one.



## HOOFSTUK 5 SAMEVATTING

Die doel met hierdie ondersoek is om die private opbrengskoerse op belegging in onderwys in die RSA vir 1960 en 1970 vir Kleurlinge, Asiërs en Blankes te bereken. Die individu se inkomste oor die arbeidsleeftyd word beskou as die opbrengs op sy belegging in 'n sekere onderwyspeil; in hierdie geval is die belegging die koste wat hy aangaan om daardie peil te bereik. Koste bestaan uit inkomste wat verbeur word terwyl 'n hoër peil bereik word, asook klasgelde. Daar word aanvaar dat Kleurlinge en Asiërs aan die begin van hul 15de jaar die keuse het om of 'n hoër onderwyspeil te bereik of te gaan werk. In die geval van Blankes word daar aanvaar dat 'n persoon aan die begin van sy 17de jaar 'n keuse kan uitoefen.

Basiese gegewens vir hierdie ondersoek is verkry uit steekproewe van die 1960- en die 1970-bevolkingsensus en bestaan uit tabulerings van inkomste volgens ouderdom volgens onderwyspeil vir Blanke, Kleurling- en Asiatiese manlike werknemers tussen die ouderdomme van 15 en 65 jaar.

Sewe onderwyspeile word gebruik. Hulle is -

Geen onderwys  
Primêre skool  
Sts. 6 + 7  
St. 8  
St. 9  
St. 10  
B en Hons. B-grade.

Inkomstestrome oor die arbeidsleeftyd is vir elke bevolkingsgroep en elke onderwyspeil uit die tabulerings bereken deur die passing van 'n tweedegraadse kromme by die mediaaninkomste van elke 5-jaar-ouderdomsgroep op 'n onderwyspeil. Die inkomstestrome wat bereken is, toon dat 'n individu se geskatte inkomste oor die arbeidsleeftyd toeneem namate die onderwyspeil hoër word. Die kwessie is nou om te besluit of hierdie inkomsteveranderlike groot genoeg is om te vergoed vir onkoste wat aangegaan word terwyl 'n hoër onderwyspeil behaal word.

Die inkomstestrome oor die arbeidsleeftyd is daarna tot hul huidige waarde verdiskonteer vir 'n vyftienjarige in die geval van Kleurlinge en Asiërs en 'n sewentienjarige in die geval van Blankes, terwyl koste in aanmerking geneem is. Koste is in hierdie berekening as negatiewe inkomste beskou. Kyk bladsy 13 vir die verdiskonteringsformule. Aangesien die koers waarteen

die verdiskontering gedoen word, 'n belangrike invloed op die verdiskonteerde waarde uitoefen, is dit 'n probleem om te besluit teen watter koers die onderwyspeile met betrekking tot hul rendabiliteit vergelyk moet word. Monetêre deskundiges het 'n koers van 6 persent voorgestel.

Die verdiskonteerde waardes teen 6 persent het getoon dat dit in die meeste gevalle lonend was om 'n hoër onderwyspeil te behaal. Dit was van toepassing op die inkomstestrukture in 1960 en 1970. 'n Vergelyking van die verdiskonteerde waardes van inkomstestrome vir die onderskeie onderwyspeile in 1960 en 1970 het 'n toename in werklike inkomste vir die tydperk 1960 tot 1970 getoon. Persone wat slegs primêre skoolopleiding gehad het, het die hoogste toename van alle groepe getoon.

Soos alreeds genoem, word die verdiskonteerde waarde beïnvloed deur die koers waarteen die verdiskontering gedoen word. As daar koste is en die verdiskontering teen steeds toenemende koerse gedoen word, sal die verdiskonteerde waarde in een of ander stadium 'n waarde van 0 bereik. Die koers waarteen dit plaasvind, word die interne opbrengskoers genoem. Indien geen koste in aanmerking geneem word nie, soos in die geval waar onderrig tot 'n sekere stadium kosteloos is, sou die interne opbrengskoers oneindig wees.

As koste as 'n belegging beskou word, gee die interne opbrengskoers die opbrengskoers op daardie belegging. Die interne opbrengskoerse wat in hierdie ondersoek bereken is (tabel 3.28), toon dat die koers afneem namate die onderwyspeil styg. Die opbrengskoers is nog hoër as 20 persent vir alle bevolkingsgroepe op alle onderwyspeile.

Daar word tot die gevolgtrekking geraak dat die inkomstestruktuur van die Republiek sodanig is dat individue in die meeste gevalle ruim beloon word vir die koste wat hulle aangaan om 'n hoër onderwyspeil te behaal.

Sekere veranderinge in die inkomstestruktuur blyk egter uit die ontledings. Kleurlinge en Asiërs word in toenemende mate in die handel en nywerheid in diens geneem. Die oorgrote meerderheid is ambagsmanne, operateurs en halfgeskoolde werkers met 'n lae onderwyspeil (primêre skool of laer). Die werklike inkomste van hierdie persone het oor die tydperk 1960-1970 aansienlik gestyg. Dit beteken dat die verbeurde inkomste van persone vir hoër onderwyspeile styg en dat die opbrengskoers op die hoër onderwyspeil neig om af te neem.

Die verdiskonteerde waardes van inkomstestrome oor die arbeidsleeftyd teen 6 persent vir Blankes toon dat dit in 1970 nie lonend was om met slegs 'n st.10-kwalifikasie te begin werk nie. St.8- en st.9-skoolverlaters is geneig om werk te kies waarin hulle 'n soort indiensopleiding soos 'n vakleerlingskap ontvang wat hulle baie min kos. Die skoolverlaters met 'n st.8- of st.9-kwalifikasie was, wat inkomste betref, beter daaraan toe as skoolverlaters met 'n st.10-sertifikaat en geen verdere formele opleiding nie.

Dit blyk verder uit die ontledings dat die gevarieerde beroepstruktuur van gegradueerdes neig om die opbrengskoers op die totale belegging te laat toeneem. Die Kleurling-gegradueerdes, van wie net meer as 60 persent onderwysers is, se toename in werklike inkomste (1960-1970) beloop slegs 7 persent, wat heelwat laer is as dié van Asiërs (20%) of Blankes (33%), wat oor 'n veel meer gevarieerde beroepstruktuur vir gegradueerdes beskik.

Om af te sluit: Die opbrengskoerse wat in hierdie ondersoek bereken is, alhoewel laer vir die oorgrote meerderheid onderwyspeile in 1970 as in 1960, toon dat 'n belegging in die onderwys uiters lonend is.

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